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Studies of Holographic Grating Formed in Polymer-Dispersed Liquid Crystal Films and Their Dynamical Behavior

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Abstract

We have developed an economic liquid crystal-polymer dispersion material that can be used for storing optical holographic images, The obtained results show that the written grating-holograms are permanent, but are electrically switchable. Further, we studied the dynamical behavior and the temperature-dependence of the formed gratings. The gratings morphologies were also investigated using scanning electron microscopy (SEM). The results showed the thermal grating was competing with the grating due to photopolymerization. The former dominated in the initial period, Later, it was offset or quenched by the photopolymerization effect which eventually dominated and determined the characteristics of the final gratings whose diffraction efficiencies were found to have a good correlation with their SEM images.

Key words：Holographic storage; Liquid crystal polymer dispersions; Dynamics